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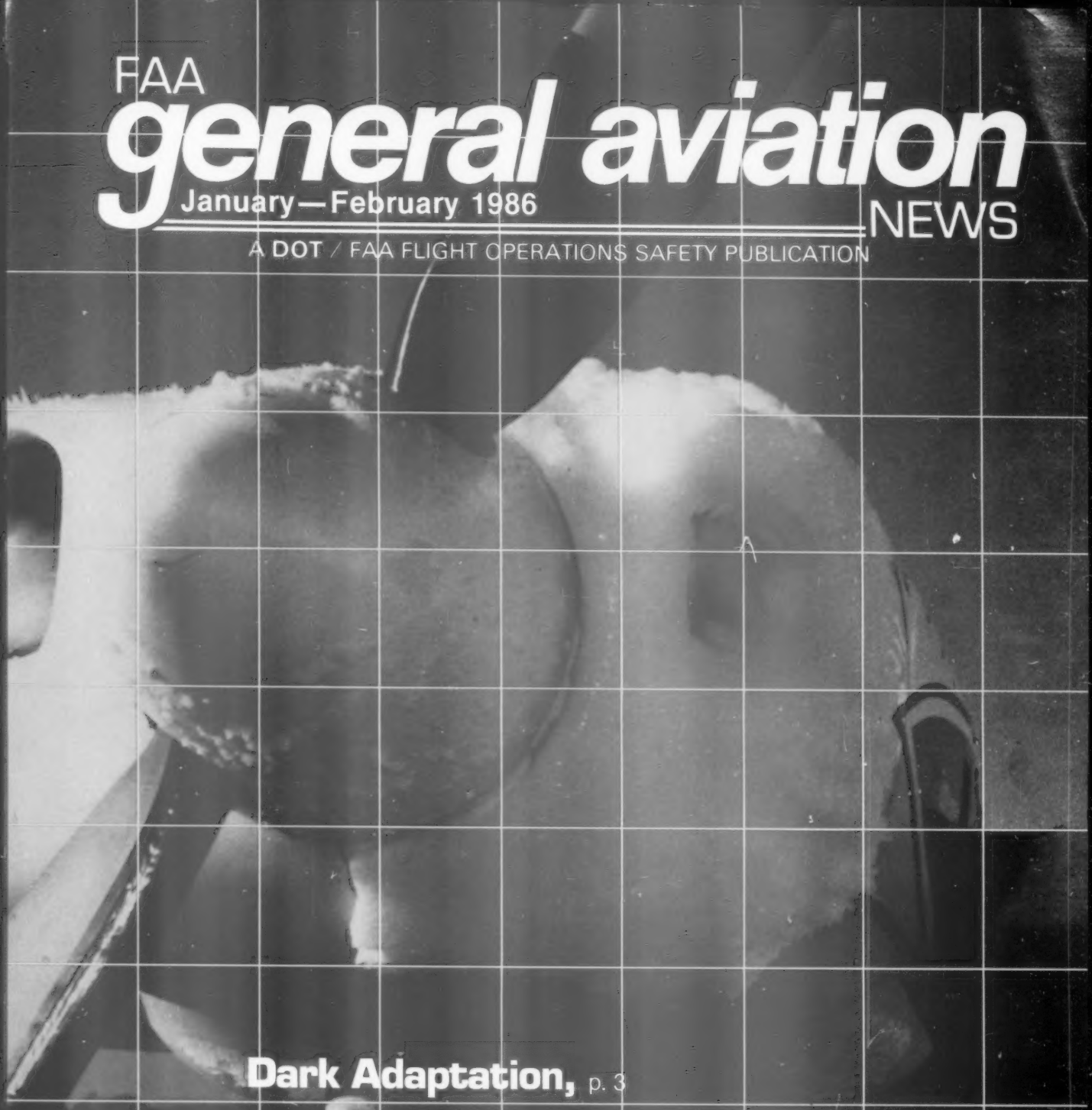

Dark Adaptation, p. 3

ALSO IN THIS ISSUE:

- The Great Trans-Atlantic Air Race, p. 7
- LORAN-C Instrument Approaches, p. 8
- Helicopters and Ice, p. 10
- NOTICES TO AIRMEN, p. 12

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BRIEFS

AIR SECURITY. Pilots whose routes penetrate coastal Air Defense Identification Zones (ADIZ) will be interested in new Advisory Circular 99-1B, "Security Control of Air Traffic." Unless you are on a flight plan in an ADIZ, the North American Air Defense Command (NORAD)--who is responsible for monitoring air traffic in ADIZ's--will consider you either hostile or unfriendly and take measures to intercept. The AC is free from DOT Subsequent Distribution Unit, M-494.3, Washington, D.C., 20590.

STICKING EXHAUST VALVES. A rough running engine that quickly smooths out at high RPM could be indicating a serious problem--a sticking exhaust valve. A stuck valve could bend the pushrod and rupture its shroud, allowing oil leakage and eventually engine seizure. The hazard can be averted if you use the proper grade of fuel and adhere to regular maintenance schedules. A rough-running engine is a warning sign not to be ignored.

FAA FORECAST. Anyone interested in attending FAA's 11th Annual Aviation Forecast Conference on February 27, 1986 should make reservations now; rooms are limited. Contact the Mayflower Hotel in Washington, D.C. at (202) 347-3000.

WHAT'S A U.F.O.? Not necessarily what you may be thinking. It also stands for United Flying Octogenarians, an organization of pilots over 80 years of age who think young and hold current medical certificates. If you meet the above requirement, contact them at Box 123, Murrieta, CA 92362. They conduct safety meetings for younger pilots, too.

FROZEN BREATH. Oil breather tubes vent excess pressure that builds up in a crankcase during engine operation. However, when breather tubes are blocked by ice there is no place for that pressure to vent except by blowing crankshaft seals, and that can result in complete loss of oil. The breather tubes can be blocked by ice when condensation in the tubes freeze. Several incidents have been reported during winter months. Piper, Rockwell, and Cessna have service letters on the subject, and for most aircraft there is a modification or kit to vent excess pressure. Check with your dealer or manufacturer.

DARK ADAPTATION

Short days and obscured terrain can alter the landing picture

In the winter season the number of accidents or incidents involving landings at small airports at dusk or later invariably increases. By midwinter it starts to get dark around four o'clock over much of the country, and the shortened day means that many flights which would have terminated in broad daylight in the summery half of the year cannot be concluded before nightfall.

For some pilots this is not a big problem, but for others who may not realize how dependent they are on good, clear visual reference for carrying out skillful approaches and safe landings, there are unexpected hazards. Good preparation for long winter flights includes acquiring complete information about the destination airport, such as hours of attendance, lighting arrangements, NAVAIDs in service, etc.

Flight planning even for VFR should include an alternate destination in case the en route flight time is extended for any reason and no field lights will be available; up-to-date charts and *Airport/Facility Directory;* a flashlight for reading same in semi-darkness; and eyeglasses if necessary.

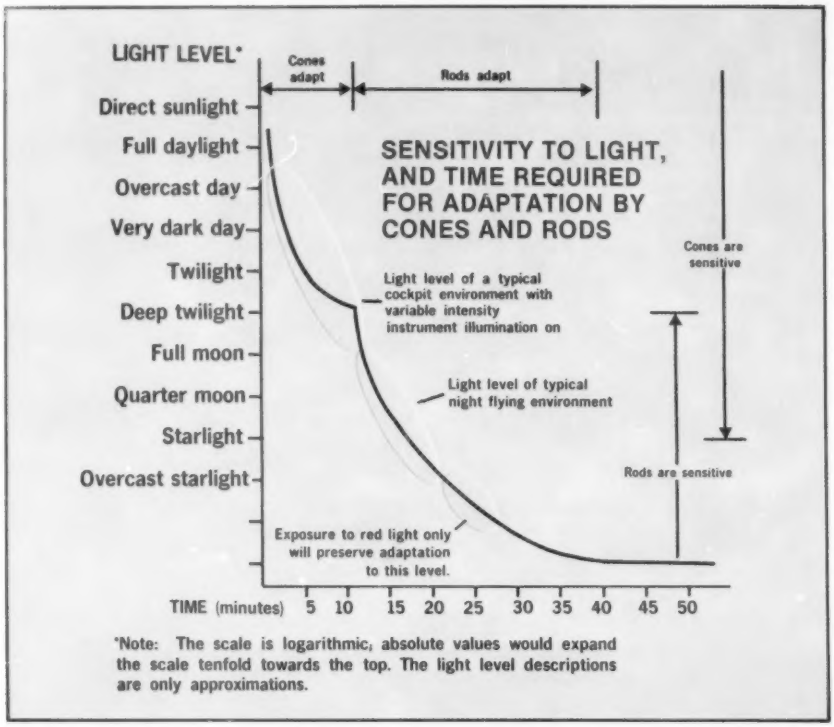
Such preparations are advisable even if you are returning to your home field, which you may feel that you know like the back of your hand. You may know it that well by daylight, but if you have never approached it after dark, with a camouflage of snow or clouds or shadows around it, and have to make a go-around or missed approach, you do not want to find out through experience where the trees or the hills or the woods are. A VFR day has a way of changing quickly to local IFR at dusk. When a pleasantly warm winter sun sets, the rapidly cooling air may bring patches of wispy clouds or fog over the runway in short order.

Snow on the runway may enhance the light levels at dusk, but it also has a way of changing your perspectives and depth perception. As with landing on glassy lakes, premature flaring is a distinct possibility.

Just how much a little darkness can affect an approach was illustrated by an accident that took place at Fulton County Airport near Atlanta, GA, recently. The pilot, with his wife and son aboard the Beech *Musketeer,* had departed Chattanooga, TN at approximately 11:30 p.m. for a return flight to their home base at Fulton County, according to the report filed by the National Transportation Safety Board.

When they arrived in the Atlanta area shortly after midnight, the tower at Fulton County was closed, but the aircraft was vectored to the airport by means of DF steers from the flight service station. Although fully qualified and current in the aircraft for night operations with passengers, the pilot had difficulty orienting himself toward the one lighted runway (8R/26L). The night sky was clear but dark.

While making a straight-in approach to 8R the aircraft was allowed to drift well to the right of the runway before the pilot recognized his predicament. He then raised the flaps and added full power for a go-around, but was unable to avoid ground contact. Damage was substantial, injuries to the pilot and his wife


LIGHT LEVEL*
Cones adapt
Rods adapt
Direct sunlight
Full daylight
Overcast day
Very dark day
Twilight
Deep twilight
Full moon
Quarter moon
Starlight
Overcast starlight
SENSITIVITY TO LIGHT, AND TIME REQUIRED FOR ADAPTATION BY CONES AND RODS
Cones are sensitive
Light level of a typical cockpit environment with variable intensity instrument illumination on
Light level of typical night flying environment
Rods are sensitive
Exposure to red light only will preserve adaptation to this level.
TIME (minutes) 5 10 15 20 25 30 35 40 45 50

*Note: The scale is logarithmic; absolute values would expand the scale tenfold towards the top. The light level descriptions are only approximations.

minor. The airplane came to rest just short of intersecting runway 14/32, after descending close to several hangars on the field. The pilot stated that he had become disoriented by strobe lights while attempting to line up with the runway.

One common fallacy that leads to night mishaps or tragedies is the assumption that automobile lights are an adequate substitute for field lighting. You line cars up at opposite ends of a runway, turn on their headlights, and you can set your little airplane down slick as a whistle. *Maybe.* If there is a complete absence of flight obstacles in the area, if the runway is completely free of irregularities, abandoned snow shovels, etc., and if it is long enough to tolerate your landing well past the threshold, etc., etc. Car lights are fine for a genuine emergency, but they are not designed to illuminate a runway; and they may be totally inadequate in some circumstances—as the pilot of a Beech *Bonanza* discovered unhappily on a dark night in Frisco, NC.

The *Bonanza* was headed for Billy Mitchell Field on Cape Hatteras, NC about 120 nautical miles from the departure point, Norfolk, VA. However, according to the investigation of the National Transportation Safety Board, the pilot was unable to get started until late in the afternoon. He knew that the airport lighting on the single runway (06/24) shut down 30 minutes after sunset, so he arranged with a friend on Hatteras to park a car at the approach end of runway 06 and to turn the lights on at approximately 8:30 p.m. The driver of this car later told the Safety Board that after the aircraft arrived in the vicinity the pilot attempted half a dozen approaches but broke off and executed a go-around in each case. He noted that a strong, southwest wind was "rocking the plane quite a bit," and that the airplane did not line up very well with the runway. On the seventh go-around the *Bonanza* drifted to the right, struck a power line (noted in the *Airport/Facility Directory*), then crashed and burned.

Even when normal field lighting is present some pilots have trouble with night landings. The process by means of which the human eye adjusts to low light levels is known as "dark adaptation." The time required for dark adaptation varies considerably from individual to individual. Some persons can see "like a cat" at night, and some feel they are almost nightblind because of a slow adaptation rate.

Maximum adjustment to darkness takes at least half an hour under the best circumstances. At dusk a pilot may have little difficulty seeing outside the airplane at altitude en route, where light from the setting sun is still fairly good. But he may experience all kinds of trouble with his visual references once he descends in order to land—especially if he makes a fairly steep descent and a straight-in approach. Seeing in the dark also involves a number of physiological changes that may be of interest to airmen.

In several ways, the human eye resembles man-made devices for capturing images, such as a camera. It contains a lens to focus the images of objects at different distances, and an iris (i.e., "aperture stop") to regulate the amount of light reaching the sensors.

Like a color TV camera, the eye has three kinds of sensors, each sensitive to light of different wavelengths; these are commonly called the red, green, and blue cones. Unlike the TV camera, however, the eye also contains a fourth set of sensors, the rods. These allow the eye to see in dim light conditions. Distribution of the rods and cones differ. The fovea, where the image is focused, is a small area taking in only the central 10° of the visual field, and it is here that the cones are concentrated. Rods are sited outside the fovea, and the number per unit area of both types of receptor falls off as distance from the fovea increases.

In bright conditions, such as broad daylight or moonlight on snow, seeing is accomplished primarily or wholly with the cones. In these conditions, the pupil of the eye will be constricted, thus giving a reasonable depth of field. A normal observer will perceive a full range of colors, and will be able to detect small movements, even at the periphery. Vision at the center of the visual field is at its most acute, thus allowing us to read the small print, and see distant objects.

As darkness falls, several changes take place. These can be summarized by saying that sharpness is sacrificed for the sake of sensitivity.

In bright light, the rods are "bleached" of their sensitivity and take no part in creating images. After about 12 minutes in dim light—i.e., average moonlight or less—they have recovered enough to be more sensitive than the cones. They do not reach their maximum sensitivity, however, until more than 30 minutes have elapsed. At this point, they can detect light at 1/5000th the level at which the cones cease to function. In these light conditions, vision is monochromatic, and the ability to distinguish small or distant objects has fallen off drastically. The ability to detect flickering falls off and, because the pupil dilates to let in as much light as possible, the depth of field is reduced.

The cones adjust quickly but not the rods; moving from darkness to light and back to dark will require a period of re-adaptation. Most readers will have experienced this phenomenon while moving around an unlighted room in the middle of the night; it is possible to navigate around the furniture with some ease, but if the light is switched on momentarily, and then off, the darkness seems much "darker." That is why a too well-lighted cockpit can hamper your forward vision.

It is a peculiarity of the rods that they are not bleached out when exposed to light consisting entirely of red wavelengths. From a practical point of view, therefore, a large amount of dark adaptation can be preserved by remaining exposed only to red lighting. For many years, aircraft cockpits and flight offices were lit primarily with red lights (alternatively, those about to go flying wore red goggles). Some aircraft still use red interior lighting, and there is no harm in this as far as preserving dark adaptation is concerned. Most vision during night flying is from a mixture of cones and rods—rod vision alone

would be too coarse for detailed flight information to be perceived. From this, it can be seen that it is not necessary to use red light to a degree that protects a total dark adaptation—or it is over-insurance.

On the other hand, the night flyer must take precautions to preserve as much dark adaptation as possible in order to see terrain features at night. Aircraft instrument and interior lighting should not be turned up higher than necessary. Pilots should avoid looking directly at bright lights, particularly at close distances.

Bright lights in the corner of the eye are more damaging to dark adaptation than those viewed head on. This is because the pupil constricts less to bright lights reaching the eye at the periphery than from light entering the central visual field.

There are other factors which can affect how well you can see in the dark. Of all parts of the human body, the retina has the highest demand for oxygen in the blood and is the quickest to suffer from any reduction in the oxygen level. Thus a person's general state of health will govern night vision capability, and cigarette smoking will have an immediate and detrimental effect. Conversely, breathing pure oxygen (above 4,000') will improve night vision.

Conduct preflight while there is adequate light to reveal problems that night may hide.

Judgement of Distance

Judgement of distance at night is more difficult than by day. During daylight the pilot estimates distance by comparing the sizes of nearby and distant objects. At night this is rarely possible when the only objects visible are "points" of light. Only the brightness of the lights can be used as a cue to judging distance. This is why, on very clear nights, lights will often seem closer than they really are, and on nights when the atmospheric visibility is low they will seem further away.

Judgement of distance will also depend on what you think the light is. For example, if you believe the light to be a flashlight, then you would not expect to be able to see it at more than a few hundred yards, if that. If, on the other hand, you identify it as a very powerful spotlight, then you would expect it be much further away. Therefore, *if you misidentify the light source you may make a completely erroneous estimate of distance.*

This phenomenon explains the stories of military pilots trying to fly formation at night with stars—thinking that they were formation lights of close-by aircraft. It is possible in similar fashion to confuse stars and ground or ship lights, a thoroughly disorienting experience. Remember that a single-point light source gives no altitude information, and two lights seemingly close together may be in completely different planes. Cross reference with maps and attitude flight instruments will help.

Finally, if the light level is low enough that only the rods are functioning, then judgement of size and distance will be seriously affected because of the rods' poor acuity.

Auto-Kinesis

Auto-kinesis, or self-movement, is another phenomenon of night vision that is useful to know about. It can occur when looking at a fixed light source against a dark sky with no surrounding lights or other visual cues—a star for example. After a while the light may appear to be moving or oscillating, and thus it could be mistaken for an aircraft light. To prevent this illusion, it is necessary only to avoid prolonged focusing on any one light.

Night Viewing Techinique

Because of the distribution of the rods away from the center of the eye, it will be necessary to look a few degrees to one side or the other of an object in order to see it well when using rod, or dark, vision. Note also that the rods cannot perceive an object while the eye is in rapid motion, so it is also important to integrate short pauses in any scanning technique. (Rods can, as noted, detect moving *objects* well.)

"Night myopia" is a similar phenomenon to "empty visual field myopia." If there is nothing to look at, the lens of the eye relaxes to its least stretched position, focusing on a point one to two yards in front of the eye, or on internal reflections from the windows, particularly those associated with dirt, scratches, or rain. Making a strenuous effort to focus at infinity usually results instead in *shortening* the focal length. The only remedy is to actively search for and focus on light sources further than six yards away, however faint. The effect of night myhopia is worst in pilots wearing corrective lenses, particularly bifocals or trifocals.

Preparing to Fly in the Dark

Apart from some basic requirements such as an aircraft equipped for night flying, the appropriate night experience being held by the pilot or instructor, and the weather being above night VFR minimums, one of the first practical steps to be taken by the prospective night flyer is to become more familiar with the aircraft systems, controls, and switches. The familiarity ideally should be such that the pilot can literally operate them blindfolded. This exercise is best carried out in daylight, in a parked aircraft, and with a fellow pilot assisting (not least to ensure that items such as starters or retractable gears are not actually operated).

All night flying is to some extent instrument flying; safety requires that for night VFR a pilot be trained in some basic instrument flying skills. Most pilots, of course, gain these skills as part of their pilot training, but they may need polishing.

Night Vision

On the occasion of an actual night flight, dark adaptation of the pilot's eyes is one of the early considerations. In the office where last minute paperwork is being performed, subdued lighting will be of advantage; otherwise, make sure that you do not have to start taxi-

ing until some time elapses after leaving bright lights.

Flashlights

One of the key items that the night pilot must add to his tools of trade is a suitable flashlight. The type can be largely a matter of choice, but some guidance in choosing is in order. A "pencil" type can be easy to stow on the person and thus easy to keep track of. It will be helpful for reading charts, flight plans, memos, etc., in the subdued cockpit lighting. It is not the tool, of course, for inspecting the aircraft during the preflight, and it may not give enough light to show the airspeed indicator and altimeter readings in the event of an aircraft electrical failure. On the other hand, a very powerful flashlight is not necessary for either of these tasks, and it may degrade your night vision.

One final point on choosing a flashlight—beware of those with magnetic holders. The aircraft compass could be seriously affected.

The Preflight Inspection

Take greater care with the walk-around at night, as items of general condition that would catch your attention by day will have to be more deliberately sought out. Plan the departure so that the preflight inspection does not have to be hurried. Select one to serve your needs.

All lighting, interior and exterior, should be checked for serviceability. Set cockpit warning lights to "dim." Navigation lights should be switched on at any time that the aircraft is parked on an active flight line with other aircraft moving about.

Make certain, while there is still daylight, that the windows are scrupulously clean. If you have ever driven a car at night with a dirty windshield you will appreciate the importance of this measure. If you are not the first to fly the aircraft that day, the buildup of film, bugs, dust and grime, etc., could be quite substantial.

Startup

During the startup procedures, be certain to check the electrical system (battery condition and generator or alternator charging rate). At night you not only rely on your radios but also on lighting for such basic requirements as being able to see your airspeed indicator and altimeter. A sick electrical system could give you quite a problem if it expired while you were airborne—without a lighted runway in sight. Remember, too, that at night the system is probably having to cope with a much greater load than it would by day.

The field lighting facilities and times of use for your destination airport—and possible alternate en route—should be familiar to you. If you have to land without an operating VASI or other approach light system, try to get in some practice using only the basic rectangle of runway lights (preferably with an instructor on board). You want to be prepared for the absence of daytime clues for height above ground, such as trees, fences, people, dogs, etc.

Subdued cockpit lighting is necessary for effective eye adaptation to nighttime conditions.

Inside the Cockpit

Contour shading on maps is more difficult to see, and red lines or text will disappear if you are using red lighting. Even under subdued white lighting, the less bold items will be more difficult to see, and this applies also to your flight plan log. Before flight, therefore, make sure that your notes are bold and legible, and that any particular features on your map have been highlighted with a dark pencil or pen.

Another problem that is caused by low light levels in the cockpit is that of housekeeping. If you drop your pencil, it can be much harder to find, and you will need to know where to reach for your computer and other navigation tools. A habit of always keeping them in, and returning them to, the same stowage is an advantage. The "pencil" light can be useful for locating mislaid items, but can itself be mislaid—what then?

Outside the Cockpit

What you can see outside the cockpit will depend on three main factors: the degree of dark adaptation of your night vision, the cleanliness of the windows, and the level of light outside. The outside light level will be greatest on a moonlit night with good atmospheric visibility and a full moon. In these conditions, ground features may be almost as easily distinguishable as by daylight.

At the other extreme comes the night with a heavy overcast and no moon—"pitch dark" is the colloquial term. The only things you can expect to see on a night like this are manmade lights.

In between the two extremes there are an infinite number of light levels, but as far as navigation is concerned, you should be prepared for pitch dark. There are a couple of points to note about the use of moonlight, however. The first is that bodies of water will be surprisingly easy to distinguish from contiguous land masses, even when no other environmental details can be discerned. The second is that visibility will be better up-moon than down-moon—the reverse of ascending and descending sun visibility.

Navigation Principles and Procedures

The key to successful night visual navigation is good planning. Know what visual features you are going to use as checkpoints, and highlight them clearly and prominently on your chart. Mark time intervals on your chart so that you know when to expect prominent and lighted landmarks.

At night your dependence on radio NAVAID's is predominant, and it is a good idea to have ADF as well as OMNI. It is critically important to identify NAVAID frequencies positively and to check the ident code. Many night accidents are due to an attempt to land at the wrong airport—even air carriers are sometimes involved.

Prior to Landing

Protect your night vision as much as possible and be alert to any township light patterns that adopt a shape different to that expected, or which change their shape while you watch, or which disappear altogether. In such cases, suspect low clouds or fog. If weather obscuration does form, airmanship skill and knowledge of local conditions will dictate whether you should continue or divert to the nearest airfield that is open. If necessary, do not hesitate to declare an emergency and seek assistance from the nearest manned ATC facility.

Conquering the air and the darkness at the same time can be a very satisfying achievement—and a safe one, as long as you are realistic about the increased demands on your ability to plan, prepare, and execute. ■

Editor's note: Part of the material for this article was taken, with permission, from Flight Safety, *the civil aviation safety magazine of New Zealand.*

THE GREAT TRANS-ATLANTIC AIR RACE

Harry Hawker

On April 1, 1913, the London *Daily Mail* offered a cash prize of £10,000 British to the first person to fly directly between North America and the British Isles within 72 consecutive hours. This was an incredibly rich purse, worth about $50,000 U.S. at the time.

Considering that the minimum overwater distance (from Newfoundland to Ireland) was nearly 2,000 miles and the contemporary distance record for airplanes was just over 400 miles, many readers believed the offer was some kind of April Fool's joke.

However, Lord Northcliffe, owner of the *Mail*, was in dead earnest. Ever since the insular security of Britain had been breached by Blériot's flight over the English Channel, Northcliffe had been warning the British public that the nation could no longer rely on sea power.

The outbreak of World War I in the following year proved Northcliffe to be a true prophet as aircraft, quickly developed into a military weapon, played a deadly role in combat. When at the war's end the Northcliffe prize was renewed, no less than seven British manufacturers quickly produced an airplane and assembled crews to enter the competition. Commerce as well as national security was the spur now, as the winner of what was being called the "The Great Trans-Atlantic Air Race" had a good chance of capturing a lion's share of the new market for transport aircraft.

Testing mishaps, financing, and other problems caused most of the contenders to drop out, but by March of 1919 the Sopwith and Martinsyde entries had arrived by ship in Newfoundland.

The preflight planning strategies of both camps had come to two conclusions: 1) to take advantage of prevailing winds, the flight should be from west to east; and 2) the shortest route would be from the easternmost point of Canada—St. John's, in Newfoundland—to the western coast of Ireland. So with crew and equipment ready, both groups arrived on the scene bursting with enthusiasm.

However, they were in for a rude awakening. They had not planned on Newfoundland's contrary weather (the landscape was a sea of mud from rain and melting snow) or its rugged terrain of rocky barren hills, marshes, and dense forests.

Finding a field suitable for a runway was almost an impossibility and, once found, required extensive work pulling up stumps and filling in ruts before it was usable. After that it was a matter of waiting for favorable weather reports from enroute ships and the Coast Guard, as there were no other reporting, or forecasting facilities available.

In the meantime the U.S. Navy had decided to pioneer the path across the Atlantic using four Curtiss flying boats (dubbed NC's), with a string of destroyers stationed every 50 miles along the mid-ocean segment to guide the aircraft.

The Navy had ordered four boats to use in anti-submarine patrol, but the war ended before they were delivered. The manufacturer, Glenn Curtiss, and Navy pilot Commander John Towers urged the Navy to sponsor a trans-Atlantic attempt and with the help of Assistant Secretary of the Navy, F.D. Roosevelt, approval was obtained.

The biplanes were the largest heavier-than-air planes ever built, with a wingspan of 168′, a length of 68′, and room for a six man crew. With four 400hp Liberty engines, they were capable of doing 93 mph, but as the fuel range was only 1,300 miles, the flight would have to be done in four stages. Taking off from Rockaway, NY, the planes would fly to Trepassey Bay, Newfoundland, and from there to the Azores 1,200 miles away. The final destination was Plymouth, England, via Lisbon, a total distance of 3,925 miles. The multi-stage route would disqualify them for the Northcliffe prize, but the honor of being the first to fly across the "Pond" could be theirs.

After losing one aircraft in a harbor accident, the three plane flotilla set out from Long Island on May 8, 1919. At Newfoundland the usual stormy weather prevailed and delayed the three flying boats, but finally, on May 16, all three-heavily laden with fuel for the long flight to the Azores—managed to stagger the water and head across the ocean.

Clear weather had been forecast all the way to Ponto Delgado, capital of the Azores. But after a night of flying in close formation they encountered fog and rain clouds and had to separate while climbing to 4,000′ to get out of the clouds. They lost sight of the destroyer and after enduring hours of heavy turbulence became unsure of their position. With fuel running low, two of the "Nancies" attempted to land on the water, and were severely damaged by mountainous waves. The airplanes would never try again, but the crews were rescued by ships. the area.

The last of the flying boats, NC-4, flew on alone, as ship after ship reported zero visibility and heavy mist. There was no let-up until the last ship before the Azores called in an observation of "visibility—ten miles." At this point NC-4 was at 3,400′ over a mass of swirling clouds.

Then the clouds parted for a brief moment, long enough for the aircraft to make a quick descent and land heavily on a riptide of cross currents. They sustained some damage, were almost out of fuel and nearly 100 miles from Ponta Delgado. But they were in the Azores.

When on May 16 the two British teams saw the American flotilla take off from Trepassey Bay, they decided to wait no longer. No matter how unfavorable the weather conditions, they were not going to sit tight and give up the race without a struggle.

The first to take off, on the evening of May 18, was the Sopwith flown by chief test pilot Harry Hawker and navigator K. Mackenzie-Grieve. The son of an Australian blacksmith, Hawker was considered one of the most skilled pilots of his day. He was flying a small two-passenger biplane powered by a 350 hp Rolls Royce engine, with a cruising speed of 98 mph. Sopwith had built the plane for commercial aviation.

After an auspicious start in fair weather under bright stars, they encountered heavy rain squalls which twisted the airplane about like a leaf in the wind. Then they discovered that the radio was not working—they were cut off from the world. Worse was yet to come, as the water-

(continued on back cover)

LORAN-C Instrument Approaches

Long range navigation system will extend use of smaller airports

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The year 1986 may turn out to be a landmark in the history of general aviation if the limited use of special LORAN-C instrument approaches proves as acceptable to the national airspace system as FAA believes it to be. During calendar year 1986 FAA will authorize qualified operators to carry out specified non-precision approaches at designated airport runways, using signals emanating from distant LORAN transmitters. The agency intends to determine the type and make of LORAN-C receivers and the kind of procedures that will fit into the national airspace system before approving LORAN-C for general use as an instrument NAVAID.

The first such approach was completed in November of 1985, when a corporate Beech *King Air* 200 landed on runway 11 at Bedford, MA, with FAA Administrator Donald D. Engen at the controls. The Administrator expressed his satisfaction with the accuracy of the navigational guidance, which emanated from a triad of transmitters located at Nantucket Island, MA; Caribou, ME; and Seneca, NY.

LORAN-C was initially a long-range offshore navigation system, providing position, heading, and speed for ships hundreds of miles out at sea. (See the Sept./Oct. 1985 issue for details of how the system functions.) The low frequency (100 kHz) signal is known to travel at a predictable rate over the ocean, and with suitable corrections it can also be used over fresh water and land. Because it is low frequency it is not blocked by terrain obstacles (like VHF and UHF), but is able to follow the contour of the earth. The effective overland range can be as far as 1,000 miles.

Recent years have seen a modernization of the transmitters with solid state electronics and an enormous expansion of the information services provided by receivers—aided by computers and microprocessors—designed in large part for aviation use. Manufacturers are now producing low-cost equipment by means of which pilots will be able to navigate to any airport, land site, or fix in the nation with predictable accuracy—simply by punching in locator symbols, geographic coordinates or airport names and following a panel readout.

Starting in 1981, FAA began providing for the certification of LORAN-C equipment for area navigation in both IFR and VFR conditions. This year the agency is offering a limited authorization certificate for LORAN-C guided, non-precision IFR approaches conducted at the following airports: Bedford, MA; Burlington, VT; Columbus and Mansfield, OH; Orlando, FL; Portland and Salem, OR; and one more to be announced later. Without an authorizing certificate LORAN-C is not an approved instrument system for IFR approaches under Part 91.116.

In order to use LORAN-C for these approaches you must apply to a Flight Standards District Office in your region for a *Certificate of Authorization* or for a set of *Special Operations Specifications*, if you hold an air carrier certificate.

Applicants must be prepared to present evidence that their installed LORAN-C equipment meets appropriate airworthiness standards, as described in Advisory Circular 20-121. Flightcrew members must have completed a training program that assures (1) competency in the special LORAN-C approaches, (2) an understanding of LORAN-C navigation principals, (3) knowledge of the specific operating techniques and procedures for the approach(es) to be used, (4) familiarity with the LORAN-C cycle slip, and with the limitations of the equipment and the contents of the Certificate of Authorization, or Operations Specifications.

"In order to use LORAN-C for instrument approaches you must apply to a Flight Standards District Office in your region for a Certificate of Authorization, *or for a set of* Special Operating Instructions, *if you hold an air carrier certificate."*

The Certificate of Authorization includes a requirement that (for any type of aircraft or operation) there must be two appropriately qualified instrument-rated pilots, with one pilot monitoring the underlying Standard Instrument Approach procedure signal (localizer. The need for an underlying procedure will be eliminated eventually, as competence and confidence in the use of LORAN-C is gained by airmen and agency facilities.

Before starting on the final segment of a special LORAN-C approach the pilot-in-command must inform the governing air traffic control facility that this procedure will be used. The correct triad (or chain of transmitters) must be selected and determined to be in use, and the current area calibrations value must be entered into the LORAN receiver. At a point no later than the final approach fix an accuracy check must be performed in accordance with the LORAN-C procedures of the aircraft's flight manual.

Use of LORAN-C equipment for IFR course guidance must be discontinued whenever the monitor indicates a LORAN failure or unreliable data; or the pilot observes a panel warning of degraded navigational performance; or if he is informed by an air traffic controller that the LORAN-C system is in alarm.

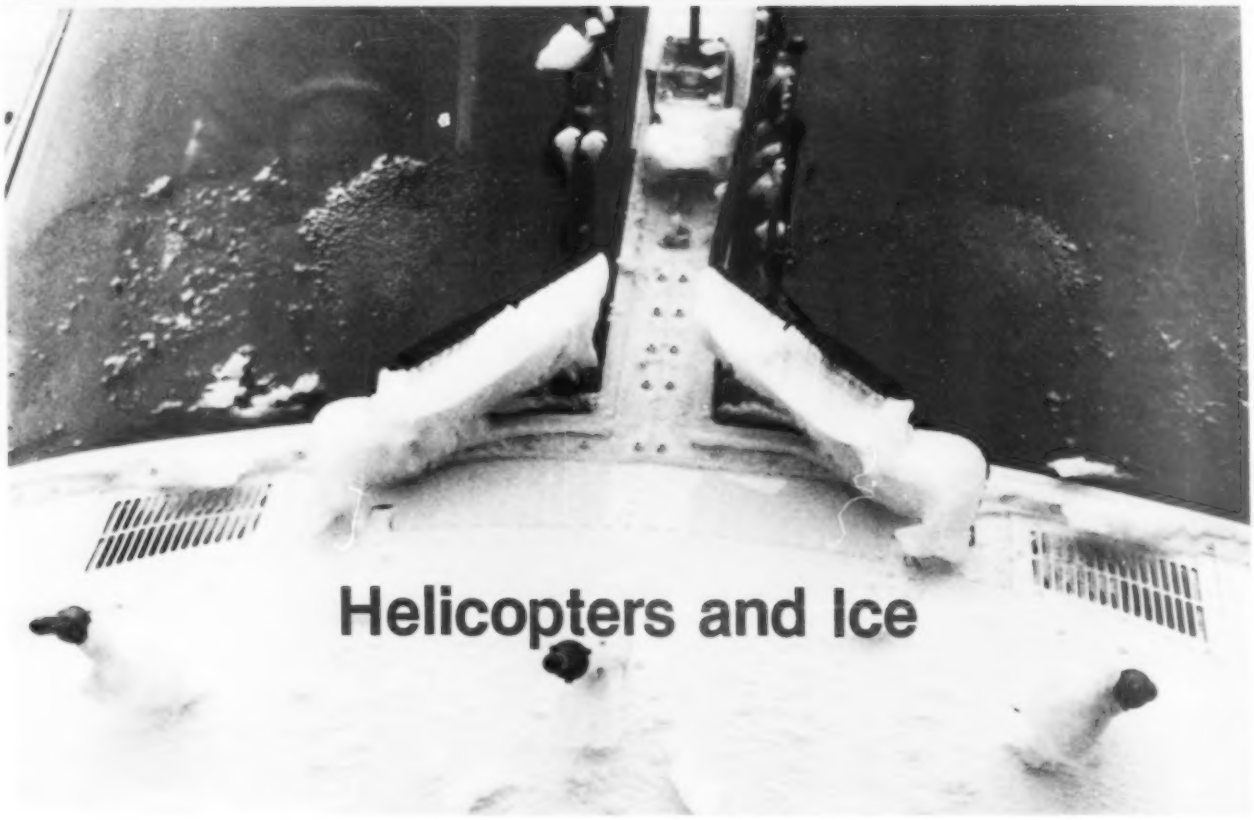
Similarly, during the current status of LORAN-C approaches, a missed approach procedure must be initiated any time the pilot who is monitoring the signal from the underlying Standard Instrument Approach procedure observes a deviation from course which would normally require abandoning that standard approach.

The details of the LORAN-C approach at each of the eight approved airport runways are provided by FAA when a Certificate of Authorization is granted. No graphic presentation or chart is included; this would have to be obtained by the operator from an independent source, such as Jeppesen. Only persons who have been issued an authorization by FAA for a special LORAN-C approach may use a LORAN-C approach chart.

The first set of procedures, issued for Hanscom Field at runway 11, Bedford, MA, is quite similar to the localizer approach for that runway, with an identical minimum descent altitude. However, air carrier operators are required to observe a landing minimum of 200 feet above the MDA and a visibility of ½ mile beyond the published minimum visibility during the first six months of operation.

These precautions are being taken because LORAN-C is a non-FAA (U.S. Coast Guard) system which is being incorporated into the national airspace. Some of the transmitters are being modernized and replaced, and there are a great variety of receivers coming on the market offering an enormous range of services and degrees of accuracy and redundancy. Some will track signals from two groups of transmitters simultaneously, for example, and some will not. Some will make error corrections automatically, others will not. From monitors installed in air traffic control towers at the eight LORAN-C approach sites, and from discussions with qualified pilot users, FAA expects to become familiar enough with the system to refine standards for equipment, and to establish procedures for instrument approaches at the thousands of airports where standard ground instrumentation is not affordable.

FAA hopes, in the near future, to see establishment of LORAN-C transmitters in the midsection of the country, so that aviation coverage will be complete and predictable. LORAN-C has already proved itself an inexpensive lifesaver for boaters and sea travelers, and it may turn out to be the wave of the future for general aviation. ■



Helicopters and Ice

Why rotorcraft should avoid icing conditions

Inflight icing takes an annual toll of all kinds of general aviation aircraft, since most of the fleet is not or cannot be adequately equipped with icing protection devices. This includes helicopters, which have some special vulnerabilities to icing in winter, when freezing levels in clouds are lower. These include:

- A great number (for many rotorcraft) of exposed parts.
- Lifting surfaces with a greater susceptibility to icing.
- Inability of pilots to observe ice developing on the rotor blades.
- A limited altitude range and airspeed capability (as compared with airplanes.)
- A smaller percentage of reserve power and airspeed (as compared with airplanes.)
- Greater vulnerability to ice shedding.
- Inherent technical difficulties that need to be overcome in order to provide reliable protection (for both anti-icing and de-icing).

Exposed parts. Although recently built helicopters are virtually enclosed in a metal skin, there are still many models in use in which the control linkages leading to the main rotor and to the tail rotor are completely uncovered. During cruise these control rods and cables undergo relatively little movement. In unfavorable conditions ice could interfere with their mobility and cause problems with blade pitch and other controls—although there is no direct evidence of any such accidents to date.

However, even on modern helicopters with full structural housing, some portions of the rotor mechanism are vulnerable to icing. For example, devices (called droop stops) designed to keep rotor blades from drooping low during shutdown and striking other parts of the helicopter or deplaning passengers, can be rendered inoperative during cruise in icing conditions. On landing this would allow continuous full flapping of the rotor, which could give the pilot control problems.

In general, because of lower airspeeds, the aerodynamic design of rotorcraft places less emphasis on streamlining and the absence of drag inducing fixtures, such as landing gear/skids, handholds, door handles, external hinges, blunt forward surfaces, etc. This increases the potential for structural icing and performance degradation.

Engine air inlet icing is also a problem for helicopters in winter, especially turbine engines. Most rotorcraft have some sort of engine induction or inlet anti-icing system using engine bleed air. Helicopter pilots who operate regularly in cold weather make it a practice of turning on the engine anti-ice system any time there is visible moisture and a near freezing OAT. Some flight manuals call for engine inlet anti-icing whenever the air temperature is below +10°C. Follow the recommendations of your manufacturer. Incidentally, the use of bleed air degrades engine performance somewhat, and this should be borne in mind when contemplating constant use of engine anti-ice.

Lifting surfaces. At first glance it might appear that the relatively broad, stable surface of a typical airplane wing would be a likelier target for icing that the twisting, flapping, flexing rotor blades which make up the lifting surfaces of a helicopter. But this is not true. A small, narrow, elongated object like a rotor blade is actually much more effective as an ice catcher than the typical wing.

"Invisible" ice. The position and movement of the rotor blades make it virtually impossible for the flight crew to observe their ice buildup and the blades are usually the first to undergo an accumulation. Eventually the drag of the ice accumulation causes a drop in engine rpm, unless there is an increase in power input. With constant-speed rotor systems, this registers as an increase in manifold pressure for reciprocating engines, and an increase in torque for turbine engines. An ice buildup on the blades in the order of one-half inch can result in a torque fluctuation of five to six psi.

Therefore, careful attention must be paid to the gauges whenever there is a threat of in-flight icing. An increasing accumulation will soon mean that in the event of engine failure autorotation would not take place. Even with normal engine function, icing will lead to a point where there is insufficient power to hold altitude.

Power reserves. Ice buildups become critical more quickly in helicopters than airplanes, because rotorcraft operate commonly at 80 to 90 percent of available power, whereas a typical general aviation airplane cruises at 65 to 75 percent of available power.

This lower power margin also means that the helicopter is much more limited in its ability to climb in an effort to relieve an icing problem. If the rotorcraft is flying in a cold front, for example, there may be an inversion of warmer air several thousand feet higher, but the rotorcraft may have insufficient power to climb that high. Likewise the airspeed limitations of some helicopters mean that once in icing conditions it will take them longer than an airplane to change their environment horizontally.

Ice shedding. Rotor blade icing is subject to self-shedding—which quickly leads to rotor imbalance and structural vibrations if the shedding is assymmetrical as is usually true. Severe vibrations may cause structural damage and loss of control. The process may develop in a vicious circle, as vibrations induce more assymetrical shedding, resulting in worsening vibrations, etc. On the other hand, the ice shedding process can be self-correcting, if dislodged ice knocks ice loose from other blades, lessening the imbalance. The outcome of rotor blade ice-shedding is not predictable.

Secondly an ice-shedding rotor system becomes, in a sense, a gigantic sling shot flinging ice pellets in all directions. As much of the ice is thrown ahead, into the path of the helicopter, the entire rotor system (as well as the fuselage, to a lesser extent) is subject to a self-induced hailstorm. Since the tail rotor is also likely to ice up and become involved in the ice-flinging melee, there is a potential for serious, even disabling damage to the aircraft.

The one advantage the helicopter pilot has over airplanes, in dealing with ice, is the ability to land quickly and safely on almost any unencumbered, fairly level landsite. This is by far the best solution to problems called by inadvertent icing. As indicated earlier there are good reasons why attempting to climb to warmer air may not be possible, or waiting out the shedding process may not be practical. In resorting to an emergency landing, of course, the concerned pilot should bear in mind that persons on the ground could be injured by flying ice chunks. Set the aircraft down as far as possible from persons or buildings on the ground. Be prepared to follow the manufacturer's recommendations for landing with ice on the blades—especially with regard to hovering and flaring.

What about ice protection systems? Here again the design of the helicopter has created inherent difficulties. Providing sufficient energy for continuous anti-icing or de-icing along the entire length of the rotor blades would require a tremendous outlay of energy, more than that which is currently available from the power sources in common use. Keeping the large plexiglass bubble or pilots' windshield area clear of ice is also a problem.

Thus far only one make and model of rotorcraft has been certificated by FAA for flight into known icing conditions, and that is the French-built Aerospatiale *Super Puma*. The *Super Puma* was developed for rescue missions and flights into otherwise inaccessible areas in weather conditions that had previously grounded such missions. Nearly a decade was spent in perfecting and testing the icing protection system.

The *Super Puma* is a twin-turbine, medium-range helicopter capable of about 173 mph. The rotor blades are constructed of a new composite material. The icing protection system consists of an OAT thermometer, an ice detector, an automatic activation and monitoring assembly, an extra alternator to power the system, de-icing on the main rotor blades, anti-iced tail rotor blades, and de-icing for the horizontal stabilizer. The pilot's and co-pilot's windshields have an electrically heated mat imbedded between two layers of hardened glass to keep forward vision clear. This windshield has survived the impact of a one-inch ice ball thrown at a velocity of 250 mph.

Each main rotor blade has a de-icing mat extended along its leading edge and curving aft for several inches on the top and bottom surfaces. Imbedded in the mat are five electrical heating strips that are automatically activated by a monitor, which "predicts" icing conditions based on the outside air temperature range. A timer keeps the strips heated for as long as the monitor senses that the aircraft is within a temperature range pre-selected by the pilot. The heat loosens the ice, which is then self-shed. Electrical heat for anti-icing is provided to the tail rotor. The stabilizer is protected by use of a de-icing boot activated by engine bleed air.

Other models are in testing for complete icing protection systems, but as yet none have been certificated.

Helicopter icing accidents have not been numerous to date, owing in large part to the care which pilots have exercised to avoid known icing and to land at the first indication of inadvertent icing. Another contributing factor is the relatively small number of makes and models of helicopters certificated for IFR operations which could expose them to icing in unfavorable conditions.

However, this number is expected to increase rapidly, following recent changes in manufacturing trends which are resulting in greater numbers of helicopters certificated for IFR flight. Whether this results in more helicopter icing accidents or not depends upon pilot alertness to weather activity, as well as a clear understanding of the vulnerability of their aircraft. ■

Aerospatiale Super Puma, *only FAA-certificated helicopter for flight into icing conditions. Protection includes de-icing, anti-icing, engine shields.*

NOTICES TO AIRMEN

Some vital flight information may not be included in a briefing

The pilot indicated the flight started out routinely—a five-hour cross country in a Piper Cherokee *to visit some friends in Comfort, NC. He had made the trip several times, although not in the last six months, and was familiar with Comfort Airpark. Before he departed he obtained a standard briefing by telephone from an FSS and was told that VFR conditions were forecast along his route. The briefer did not mention any NOTAM's. The pilot then made sure his charts and* Airport/Facility Directory *were current and planned his flight.*

Departure was normal, and once in the vicinity of Comfort, the pilot contacted Wilmington approach control for VFR advisories, which were provided.

The flight continued uneventfully until approach control radioed, "Comfort five miles, 2 o'clock. Report airport in sight." The pilot peered in the indicated direction and very shortly spotted the runway. He reported he had Comfort in sight, and radar service was terminated.

The pilot flew a standard VFR approach pattern and noticed no airplanes parked on the field. That he attributed to a busy VFR day. There was no response to his call on UNICOM, but that was not unusual at a small strip. He continued the approach. It was on short final that the pilot noticed some kind of faint marking on the runway. He was almost over the numbers when he realized it was a thinly painted "X;" the runway was closed. In momentary confusion the pilot felt the gear touch down and so decided to land anyway. On the roll-out, he swerved to miss some kind of debris on the runway, ran off the side, and nosed over in a drainage ditch. Although the aircraft was badly damaged, the pilot was unhurt.

On talking the next day with the FAA inspector, the pilot learned that the airport had been NOTAMed closed for the past three weeks while the operator took an extended vacation in Bermuda. The pilot indicated that no NOTAM's to that effect had been given him during his flight service briefing and that he thought NOTAM's were automatically included in a standard briefing. The inspector pointed out that the NOTAM had been published two weeks earlier. Tapes of the pilot's conversation with the briefer showed that he had not requested published NOTAM's from the briefer. "I have to request published NOTAM's . . .?"

"Yes, you do."

Safe flight is dependent upon an equipped, airworthy aircraft and a qualified, *informed* pilot. A pilot has at his or her disposal various sources of needed information on weather, navigation, airports, and so on. Consider, however, the *timeliness* of the material in some of those sources: VFR Sectional and Terminal Area Charts are updated every six months; IFR charts, approach plates, and the *Airport/Facility Directory* are updated every 56 days. (See the National Oceanic Service's Chart Catalog for issuance periods of other aeronautical charts and publications.) The process of incorporating changes and assuring the accuracy of such changes to charts and other printed matter does not lend itself to short-cutting. So, where is a pilot to find the most current, up-to-date information about changes in the airspace or at an airport that could affect the safe outcome of a flight?

Notices to Airmen (NOTAM's) as described in the *Airman's Information Manual*, contain information (either of a temporary nature or not known sufficiently in advance to publicize by any other means) concerning the establishment, condition, or change in any facility, service, or procedure of or hazard in the National Airspace System. NOTAM's contain information that can affect a pilot's go/no-go decision, information such as airport or primary runway closure, changes in the status of NAVAID's, ILS's, radar service, etc.

To the FAA it is implied in FAR § 91.5 that the "all available information" a pilot is expected to have before a flight means all available *current* information, especially where NOTAM's are concerned. The possibility of violating regulations aside, not obtaining current information about your flight could be considered a liability in a court of law in the event of an accident.

There are three types of NOTAM's: NOTAM (L), NOTAM (D), and FDC NOTAM's. The "L" in NOTAM (L) stands for "local" and indicates these NOTAM's receive local distribution only. They report items involving taxiway closures, men and equipment near or crossing runways, airport rotating beacon outages, and airport lighting aids not affecting instrument approach criteria. Usually initiated by an airport manager or operator to a flight service station, this type of NOTAM is not attached to hourly weather reports. NOTAM's (L) are kept on file at the issuing flight service station for facilities in its area of responsibility only (about a 400-mile area). NOTAM (L) information from other areas must be requested by the pilot either from the FSS with jurisdiction or through a local FSS, which can contact the FSS with jurisdiction. These NOTAM's are given only local dissemination because they contain material which is believed does not affect a pilot's decision whether or not to use the airport, i.e., the condition does not render the airport possibly unusable. For example, cattle near the airport, mowing near the runway, etc. They remain in effect until the initiator cancels them, or they become permanent by publication.

NOTAM's (D), in addition to local dissemination, are also given "distant" dissemination over the entire FSS telecommunications network. They contain information on navigational facilities that are part of the National Airspace System, on all airports with approved instrument approach procedures, and for some VFR airports (noted in the *Airport/Facility Directory* with this symbol §), in other words, items serious enough to affect whether or not the airport or some facility is usable. NOTAM's (D) can be initiated either by an airport manager, the air traffic service, or an FAA regional or field office to a local FSS. They are then stored in a central database and are included in the hourly weather reports provided to flight service stations. NOTAM's (D) remain valid until expiration (usually set by the initiator), publication, or cancellation by the initiator.

An FDC NOTAM is regulatory in nature and is initiated and transmitted by FAA's National Flight Data Center via teletype. In addition, FDC NOTAM's are published in a biweekly publication called *Notices to Airmen* (*Class II*). The NFDC is an office in FAA Headquarters in Washington, D.C. where safety information for a number of aeronautical publications is compiled and organized. NFDC obtains the NOTAM information from FAA regional offices and the air traffic service or an airport/facility operator. FDC NOTAM's remain in effect until canceled by NFDC. FDC NOTAM's are considered regulatory because they deal with airspace, airways, instrument approach procedures, and aeronautical charts.

Temporary flight restrictions—which have the weight of regulations—are also advertised by FDC NOTAM. (Temporary flight restrictions are put into effect over an area where some incident or event has generated a great deal of public interest and is, therefore, likely to create an air congestion hazard. Major sporting events, parades, natural disasters,

etc., are typical. A fairly recent, well-known temporary flight restriction was that imposed over Mt. St. Helens during its active period.)

Until they are published in the biweekly Notices to Airmen publication, NOTAM's are automatically included in the *standard briefing* given by an FSS briefer for a pilot's flight plan area. This includes NOTAM's (D), NOTAM's (L), and FDC NOTAM's. However, once they have been published, they must be specifically requested by the pilot during a preflight briefing. That is why reviewing published NOTAM's or "Class II NOTAM's" should be part of your preflight planning. (In any of the other briefings offered by an FSS—*abbreviated*, *outlook*, or *inflight*—NOTAM's must be requested. Unpublished NOTAM's obtained from an FSS are called Class I; published NOTAM's are called Class II.)

NOTAM's in the Class II publication are of either a temporary nature (but expected to remain in effect for an extended period) or permanent changes published as an interim step before inclusion in an IAP, on appropriate charts, or in the *Airport/Facility Directory*. The information will be published every two weeks until it expires or is canceled. Temporary and permanent items are differentiated by the notations *FI/T* (flight information which is temporary) and *FI/P* (flight information which is permanent), respectively, in the publication.

The biweekly publication, entitled "Notices to Airmen - Class II NOTAM's," is published by FAA's National Flight Data Center and may be purchased on a subscription basis from the U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20591. The most recent price was $51.00 per year (26 issues) for domestic delivery, but check with GPO before ordering.

Information in this publication is not limited to a specific geographical area, like NOTAM's (L), or to specific airports, facilities, etc., like NOTAM's (D). It encompasses changing conditions in the airspace or on the ground. For all airports currently listed in the *Airport/Facility Directory*, the publication gives any abandonments, openings, or closings; and openings, closings, commissionings and permanent closings of runways.

For NOTAM (D) airports (all IFR airports and selected VFR airports) Class II NOTAM's provide information on 1) airport operating restrictions for air carriers and crash/fire/rescue facilities; 2) approach light systems; 3) control zones; 4) displaced thresholds; 5) runways; and 6) runway light systems.

Class II NOTAM's also provide information on NAVAID's, communications, and other services. For NAVAID's they indicate commissioning of new facilities, decommissioning of old, frequency changes, restrictions, and outages. Information on air traffic control towers and approach controls include commissionings and decommissionings and hours of operations. The same type of information is presented for flight service stations and remote communications outlets, as well as information on automated weather observing systems.

The publication itself is divided into two sections, the first containing, respectively, general NOTAM's, airway NOTAM's, flight restriction NOTAM's, and NOTAM's on airports, facilities, and procedures—all listed by state. Section II contains "Specials," which are often too lengthy for Section I or which may contain supporting graphics. Section II will have material depicting temporary MOA's or restricted areas or temporary procedures for a special event, such as a fly-in. The material in Section I is greatly abbreviated to save space, but a glossary of abbreviations is included in the booklet. Of course, those requested from an FSS will be "translated" by the briefer for you.

Other than directly from a briefer or the Class II publication, there is a method to obtain NOTAM's in flight. Some FSS's make unscheduled broadcasts over VOR's with voice capability (no underline on the frequency shown on charts). These "Aviation Broadcasts" may be issued when a special weather report is made, when urgent PIREP's should be disseminated, or when NOTAM's—(L) or (D)—are particularly important. For example, a runway might be NOTAMed closed for a short time to remove snow or ice. Unfortunately, these broadcasts are made randomly (they are *unscheduled*, remember) and would require the pilot to monitor the VOR frequency constantly—not easy when you have other frequencies to deal with.

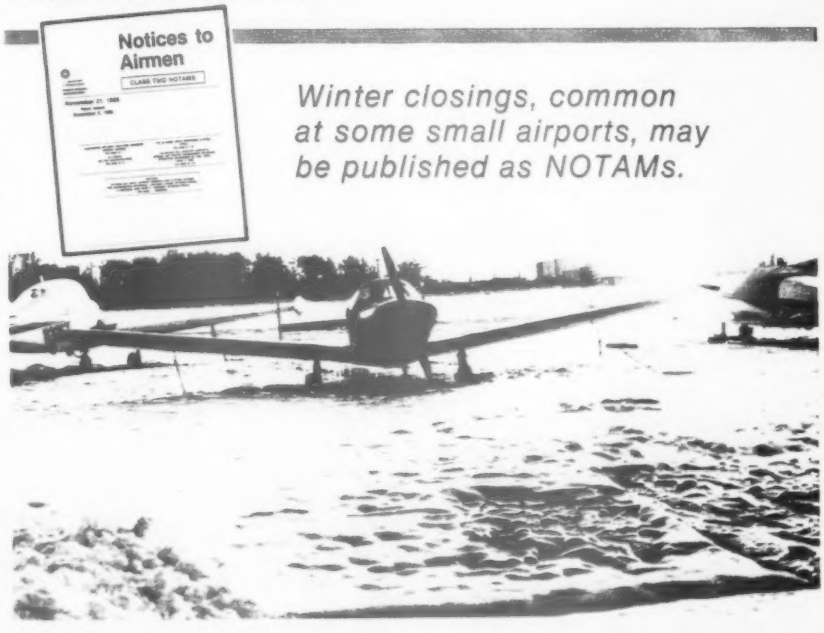
There is also what may be considered a fourth type of NOTAM, those involving foreign locations, and that includes Mexico and Canada. The NFDC keeps foreign NOTAM's on file, and they may be obtained from any FSS on request. *International NOTAM's* is another biweekly publication featuring NOTAM's for and about foreign locations. Their content and format are similar to that for the Class II publication. This subscription also comes from the Government Printing Office (address above), and the current price is $48.00 per year.

Practically speaking, what good are all these NOTAM's for everyday flying? As mentioned earlier, obtaining NOTAM information is implied by § 91.5 (". . . all available information . . ."). Knowing all you can about your place of intended landing or the route you are to take is also just plain good sense. Reading about a closed runway in the safety of your den is far preferable to noticing an "X" on a runway as you turn on short final. Further, even though you carry the most up-to-date charts, approach plates, and *Airport/Facility Directories*, changes can occur before the next editions. NOTAM's assure that you are the best informed pilot you can be.

For example, construction near an airport could involve a permanent change in the minimums for an instrument approach, or even cancellation of the approach altogether. If you have not obtained this information from NOTAM's before flight, you could be in violation of Federal Aviation Regulations. Worse yet, you could become an accident statistic.

NOTAM's are helpful to all pilots, VFR and IFR, even though the bulk of NOTAM's may seem geared to instrument flying. VFR pilots will want to know the status of runways and facilities at airports and NAVAID's they use. Indeed, the *Airman's Information Manual* suggests that VFR pilots practice IFR procedures whenever possible, especially obtaining NOTAM's from your preflight weather briefing.

"I didn't know" is never an acceptable excuse. ■



Winter closings, common at some small airports, may be published as NOTAMs.

TRANSPONDERS MUST BE "ON" IN CONTROLLED AIRSPACE

Pilots of general aviation aircraft now must keep their transponders turned to the "on" position at all times while flying in any controlled airspace, whether they are communicating with air traffic control or not. Until this change to FAR § 91.24, activated transponders were required only in terminal control areas and above 12,500′ MSL.

Keeping the transponder on while in controlled airspace—even if VFR—presents a positive radar signal to air traffic controllers, which enables them to track aircraft more accurately and helps reduce the mid-air collision potential.

The only exception to the new requirement would be a controller request to turn the transponder off or to "stand-by" or "low," because of radar clutter—an infrequent occurrence—in busy traffic areas.

FOURTEEN ARSA's IN PLACE; 30 NEW SITES PROPOSED

Thirty more major airports have had airport radar service areas (ARSA's) proposed for their immediate airspace. As of the beginning of this year, ARSA's were in place at Albany, NY; Anchorage, AK; Austin, TX; Baltimore, MD; Bradley, CT; Columbus, OH; Corpus Christi, TX; MacArthur/Islip, NY; Pensacola NAS, FL; Pensacola Regional, FL; San Antonio, TX; Syracuse, NY; Tulsa, OK; and Whiting NAS, FL. The configuration of several of these ARSA's were changed in response to public comment.

ARSA's are two-layered, circular airspace around a primary airport, where all traffic is known and monitored by air traffic control. Aircraft are vectored only as necessary for conflict avoidance and sequencing. Two-way radio communications are mandatory. Shown on sectional charts by blue hash marks, ARSA's are replacing the voluntary terminal radar service areas (TRSA's).

In addition to other locations already published in *FAA General Aviation News* (May/June 1985; Sep. /Oct. 1985), the next 30 candidate airports are:

ALABAMA:
Birmingham
ARIZONA:
Davis-Montham AFB
Phoenix Sky Harbor Int'l
Tucson Int'l
ARKANSAS:
Adams Field, Little Rock
CALIFORNIA:
Beale AFB
Castle AFB
McClellan AFB
Mather AFB
Metropolitan Oakland Int'l
Sacramento Metro
FLORIDA:
Tampa Airport
GEORGIA:
Columbus Metro
INDIANA:
Michiana Regional
Indianapolis Int'l
KANSAS:
Wichita Mid-Continent
KENTUCKY:
Greater Cincinnati Int'l
Standiford Field
LOUISIANA:
Lafayette Regional
NEW MEXICO:
Albuquerque Int'l
NEW YORK:
Greater Buffalo Int'l
NORTH CAROLINA:
Charlotte/Douglas Int'l
Raleigh-Durham
TENNESSEE:
Memphis Int'l
Nashville Metro
TEXAS:
Dallas Love Field
UTAH:
Salt Lake City Int'l
VERMONT:
Burlington Int'l
VIRGINIA:
Washington Dulles Int'l
WISCONSIN:
General Mitchell Field

For dates and locations of public hearings in the respective areas, contact your local FAA field office. Comments should be sent to FAA's Office of the Chief Counsel, 800 Independence Ave., S.W., Washington, D.C. 20591.

FAA INAUGURATES "BACK-TO-BASICS"

A three-year campaign to reduce radically the toll of readily preventable accidents in general aviation has been launched by FAA on a national scale.

This "Back-to-Basics" campaign was activated by FAA Administrator Donald D. Engen, who noted that while the U.S. safety record is second to none and steadily improving, there has been a continuing pattern of pilot-error accidents that simply never should have happened.

These accidents have been associated with 12 basic components of flight operations, and an intensive effort will be made to heighten pilot awareness of how and why the accidents occur. Three months of each year will be dedicated to each subject. Pilot safety seminars in all of the states, sponsored by aviation industry groups and the FAA, will all deal with the same subject during this period. For example, the first quarter of 1986 will spotlight takeoff and landing procedures.

Unofficially, there were over 1,000 takeoff and landing accidents in 1985 alone. Accidents during these phases of flight have traditionally comprised the largest grouping year after year.

For a schedule of safety meetings in your area on 1986's topics, consult your Accident Prevention Specialist or Counselor or an FAA district office. Anyone interested in participating in Back-to-Basics by sponsoring a safety meeting should contact their local Accident Prevention Specialist for assistance.

MORE AUTOMATED FSS'S

Eleven newly automated flight service station hubs are scheduled to be operating in 1986 at the following locations:

Terre Haute, IN (includes LaFayette, IN)
Green Bay, WI (includes Milwaukee, WI)
Columbia, MO (includes Kansas City, MO)
Conroe, TX (includes Houston, TX)
Macon, GA (includes Alma, GA)
Prescott, AZ (includes Phoenix, AZ)
Reno, NV (includes Las Vegas, NV)
DeRidder, LA (includes New Orleans, LA)
McAlester, OK (includes Oklahoma City, OK)
Ft. Dodge, IA (includes Des Moines, IA)
Hawthorne, CA (includes Los Angeles, CA)

Automated briefings via touch-tone telephone, similar to those described for the Leesburg, VA AFSS in the November/December 1985 issue of FAA GENERAL AVIATION NEWS, can be expected at each new station.

LATEST AIRMAN PUBLICATIONS

Inspection Authorizations

A list of certificated mechanics with inspection authorization is found in AC 65-13H, "FAA Inspection Authorization Directory." Purchase from Superintendent of Documents, Government Printing Office, Washington, D.C., 20402.

• A Question of Compensation

Is it considered an operation for compensation or hire if I, as a private pilot, take aerial photos from my experimental aircraft and sell them?

Name withheld

A private pilot may act as pilot in command of an aircraft in connection with any business or employment if the flight is only incidental to that business or employment and persons or property are not carried for compensation or hire. Therefore, your taking photos, which you subsequently sell, from your experimental aircraft would appear to be permissable *unless* you were carrying someone else who was taking the pictures and selling them [FAR § 91.42(a)(2)].

If there are further considerations which require discussion, consult your local flight standards district office.

Just a reminder: Since you are using an experimental aircraft, you may not operate over densely populated areas or in congested airways.

• When Words Co-lide

I enjoy your magazine very much and in fact it is far better in accuracy and authoritativeness than at least one of the popular, commercial aviation magazines. Please do not take the criticism that follows out of context. It has to do with dropping letters out of words.

Most writers would never make the following errors in spelling: co-lide, co-lision, co-lect, co-lateral, co-lusion; and they probably would not even commit such mis-spellings as co-loquial or co-late. But when it comes to collocate, *up pops the spurious hyphen, "poof" goes the disappearing "l;" born is the illegitimate "co-locate."*

FAA sources used to be uniform—and nearly unique—in getting this popularity misspelled word right. But alas, now even the FAA GENERAL AVIATION NEWS has fallen on its face ("Instrument Approach Problems," July/August 1985).

I appeal to you as Editor: Can you not see that all your contributors learn to spell it?

Dr. Newton W. Miller
Redlands, CA

Criticism accepted. Examine the article on automated flight service stations in the November/December 1985 issue.

By the way, "misspellings" as used in your second paragraph above, also is not supposed to have that "spurious hyphen."

• A Familiar Ring

Thanks for the September/October 1985 article, "The Enemy Within," about proper winter storage for aircraft. That title, however, seems familiar. I know I've heard it somewhere. Where did you borrow it from?

Sharon Marcey
Falls Church, VA

It is a well-used literary phrase referring to treasonable actions, popularized in an episode of a famous science fiction television program currently in re-runs somewhere.

• BFR and the Wings Program

I have a question regarding FAR §61.57. It states, in part, that a person who has completed a pilot proficiency check within the preceding 24 months need not accomplish the biennial flight review (BFR). Would getting one of the Phase Wings under the Pilot Proficiency Program count as a BFR? If so, does the CFI need to so annotate the logbook?

Ralph Tanner
Kalamazoo, MI

The flight time required—one hour of airwork, one hour of instrument flying, and one hour of takeoffs and landings per phase—to obtain either of the Phase I-V wings in Accident Prevention's Pilot Proficiency Program could, upon the discretion of the flight instructor, be considered satisfactory for a biennial flight review. (Attendence at an FAA-sponsored safety meeting is also required to obtain a set of wings.) If the CFI determines that the qualifications of the BFR have been met, a specific BFR notation must be made in the airman's logbook.

• Clean Communications

Recently I was on a 250-mile cross-country flight for the instrument rating. The weather was absolutely VFR—not a cloud in the sky, and you could see forever.

The first stop was to be at Lancaster, PA for the ILS there. I had not filed IFR, so about 20 miles from Lancaster I tuned in the controlling facility (Harrisburg Approach Control).

The first thing I heard was the controller call up an airliner whose captain responded. After a brief, routine exchange the controller then asked what the airline's policy was on shipping pets, specifically two collie dogs that another controller wanted to take with him when he transferred to San Juan, PR. The pilot outlined the policy, the two discussed its pro's and con's, and the captain told the controller to get in touch with the airline's chief pilot on the field for further information. The controller thanked him and "moved on." This took up a good five minutes while I fumed.

Initially I thought I had tuned in UNICOM by mistake, but a check and double check showed I had the correct frequency. When I did get through, the controller responded right away, gave me a squawk, then let me fly through the localizer before he remembered me again. Shortly after I alerted him that I had gone through the localizer and was headed away from Lancaster, a different controller replaced him. Maybe it was the regular shift change; I don't know.

All I could think of was a lot of "What if's." What if I were trying to declare an emergency? What if it had been a heavy IFR day? and so on. Maybe it was because the weather was so good that he felt he could let up a little bit. Anyway, who should know about this?

Name Withheld
Woodbridge, VA

It can be reported to the Harrisburg Tower Air Traffic Manager if you so desire. You would have to give the exact date and the approximate time of the occurrence. Tapes of controller/pilot conversations that are made routinely are not kept for more than 15 days, so it is best to act at once. If it happens again, make a full stop landing and a call to the tower manager.

If you wanted to report without giving your name, there is the Aviation Safety Reporting System, where such safety issues are investigated and approximate action taken. Any personal information which you place on the form, which is available from FAA field offices and most towers, is de-identified to preserve your anonymity.

There is also the FAA Safety Hotline, which will also keep your identity confidential. The toll-free number is 1-800-255-1111; for the Washington, D.C. local area dial 426-9365.

Such behavior is certainly the exception and not the rule. Controllers, like pilots, cannot afford to be lulled into complacency in good weather.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.

• Traffic Separation in CZ's

I have heard pilot instructors make the statement that VFR and IFR traffic are separated by air traffic control in a control zone. I keep telling them this is nonsense—isn't it?

William Cowan
Lynn Haven, FL

That could be a dangerous and misleading statement. In VFR weather the pilots of both VFR and IFR aircraft must scan continuously for other traffic. If the ceiling is less than 1,000' or the visibility is less than three miles in a control zone, VFR aircraft are not allowed in the control zone without a special clearance from ATC. In a control zone IFR traffic is given separation from other IFR traffic and any SVFR traffic.

• Free to Choose

Your response to the "ARSA Questions" in the July/August 1985 "Forum" fails to address the real substance of the question from the non-transponder equipped pilot who has been given vectors to establish identification and position before entering an ARSA and wants to know if he must comply. Isn't the answer really a "yes"? Doesn't that make the ARSA a mini-TCA, like the writer says?

Richard J. Lewis
Red Bank, NJ

If he wishes to enter ARSA airspace, yes, he must comply with ATC instructions. However, he may have the option of proceeding to his destination without penetrating the busy airspace of the ARSA.

The only requirement for operation in an ARSA is two-way radio communication with the air traffic facility in charge. The requirements for operation in a Terminal Control Area (TCA) are 1) an appropriate authorization from ATC; 2) a private pilot certificate; 3) an operable VOR or TACAN; 4) two-way radios; and 5) an altitude encoding transponder.

INSTRUMENT CORNER

• Instrument X-C Requirements

The regulations which deal with cross-country distance requirements are vague and have been variously "interpreted." The only clear definition for the purpose of certification is that for a private pilot certificate you must have made one 300 nmi. flight with at least one leg of 100 nmi. and each remaining landing at least 50 nmi. from the last point of departure.

Question: What is the cross-country distance requirement for the instrument rating?

Richard Klein
Plano, TX

The cross-country experience requirement for an instrument rating is 50 hours of PIC cross-country time as a private pilot. The flights which comprise these 50 hours must be at least 50 nmi. from the point of departure to the point of landing.

Part of the required flight training for an instrument rating is cross-country flying in actual or simulated IFR conditions, including one trip of 250 nmi. There is no specific distance requirement for each leg, but the round-robin distance must be 250 nmi.

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Famous Flights *(continued from page 7)*

cooled engine started running hot. This had happened before, when rust in the radiator clogged the filter. Following the classic procedure to dislodge radiator obstructions, Hawker climbed to 12,000', the maximum ceiling, cut the engines and nosed the plane over, plunging downward about half a mile before pulling out. This seemed to take care of the rust problem temporarily. The same maneuver would be used several more times before the flight was over.

When dawn broke, the hope of better weather died with the appearance of black thunderheads. After flying nearly 1,000 weary miles, it became obvious to Hawker that the overheated engine would not carry them much farther. Spotting a passing ship below, they ditched the airplane in the ocean and were picked up. The ship did not have a radio, so it was a week before anyone in England knew they were safe. They received a £5,000 consolation prize from Lord Northcliffe for making the attempt.

The second British contender, Fred Raynham, had readied the Martinsyde biplane (a converted military bomber) as soon as he received word the Sopwith was going. He too was plagued by misfortune as the soft ground kept the plane from getting enough speed to take off. On the third attempt it finally left the ground, only to be slammed back to earth by a strong gust of wind. The long awaited fight ended before it had really begun.

The field was now clear for the NC-4 to finish the last 783 miles from the Azores to the European mainland in a leisurely fashion with a fully repaired airplane. The crossing ended on May 27 in Lisbon, and the crew reached their ultimate destination, Plymouth, England, on May 31. The elapsed time was 24 days, the time in flight 57 hours and 16 minutes.

The first trans-Atlantic flight had now been accomplished by U.S. Navy pilots, who were acclaimed heroically on both sides of the ocean. But the Northcliffe prize was still waiting to be won, and the British had not given up yet. In England a last ditch effort was being prepared by two ex-military flyers, John Alcock and Ted Brown, who would undertake one of the epic journeys of aviation history.

(To be concluded in the March/April issue.) ■